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U.S. DEPARTMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

FINAL OU-1 SAMPLING AND ANALYSIS PLAN HOT SPOT REMOVAL

SEPTEMBER 1994

ADMIN RECORD

A-OU01-000667

FINAL
OU-1 SAMPLING AND ANALYSIS PLAN
HOT SPOT REMOVAL

Rocky Flats Environmental Technology Site
(Operable Unit No. 1)

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

September, 1994

INFORMATION ONLY

Effective Date: 9/1/94 MOP 9/14/94

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DOCUMENT CLASSIFICATION REVIEW WAIVER
PER R.B. HOFFMAN, CLASSIFICATION OFFICE
JUNE 11, 1991

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LIST OF ACRONYMS

BNA	Base/Neutral/Acid
COC	Chain-of-Custody
DMP	Data Management Plan
EPA	Environmental Protection Agency
FIDLER	Field Instrument for the Detection of Low Energy Radiation
FGSS	Field Germanium Gamma Spectroscopy System
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
HPGe	High Purity Germanium
IHSS	Individual Hazardous Substance Site
LDR	Land Disposal Restrictions
LLW	Low Level Waste
OU	Operable Unit
PCB	Polychlorinated Biphenyl
pCi/g	Picocuries per Gram
PRGs	Preliminary Remediation Goals
QAA	Quality Assurance Addendum
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
SAP	Sampling and Analysis Plan
SVOA	Semi-volatile Organic Analysis
SVOC	Semi-volatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

1.0 INTRODUCTION

In August, 1992, elevated concentrations of radiological contamination were detected during a routine radiological survey performed to support maintenance activities on a groundwater monitoring station (Well Number 38291, Operable Unit 1). The radiological contamination was noted at a small (approximately 0.3m^2) isolated location northeast of the well head. In order to determine the extent of this "hot spot" and to ascertain if additional anomalies exist, a supplemental field investigation was conducted.

This field investigation was conducted in January - February, 1993 at Operable Unit 1 (OU 1) within Individual Hazardous Substance Sites (IHSSs) 119.1, 119.2, and 130. The investigation utilized a Portable Gamma Spectrometry System, a Field Germanium Gamma Spectroscopy System (FGSS) and a Field Instrument for the Detection of Low Energy Radiation (FIDLER). The investigation identified a total of four radiological anomalies, two of which indicated elevated activities above background levels for americium-241 and plutonium-239. The remaining two anomalies showed activity concentrations of uranium isotopes above the background levels established for OU 1 (EG&G, 1993a).

Physical sampling and subsequent laboratory analysis of the soil was also conducted. Analytical determinations included radionuclides, metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and pesticide/polychlorinated biphenyl (PCB) analysis. Review of the validated data from this investigation indicated the presence of mercury, PCBs, tetrachloroethene, toluene and various SVOCs in the media, along with significantly elevated concentrations of radionuclides above background levels.

In addition, for this accelerated hot spot removal, two uranium anomalies (881-16/17 and 881-18/19) that had been identified in the OU 1 RCRA Facility Investigation / Remedial Investigation Report (EG&G, 1994) were investigated. These additional hot spots were designated as hot spots during soil sampling that occurred in 1987. Since 1987, soil analysis, including the Supplemental Surficial Radiological Characterization done for OU 1 in 1993, had not indicated elevated concentrations of radionuclides in 881-16/17 and 881-18/19. Additional soil surveying was done to verify the existence or non-existence of hot spots 881-16/17 and 881-18/19/ during July and August, 1994, using the Field Germanium Gamma Spectroscopy System

(FGSS) and the Field Instrument for the Detection of Low Energy Radiation (FIDLER). These anomalies were determined to meet the DOE 5400.5 criteria for hot spots (i.e., exceeds thirty times the appropriate limits for soil).

Based upon the levels of radionuclides in the soil, it was determined the six hot spots would be excavated and the contaminated material would be placed into drums to await treatment, and/or disposal. Since the previous investigation indicated the presence of RCRA constituents in addition to the radionuclides, there is a significant probability the material excavated from the hot spot areas may be a mixed waste. If further background information is required, please see the Final Phase III RFI/RI, RFP 881 Hillside Area (Operable Unit No. 1) (EG&G, 1994).

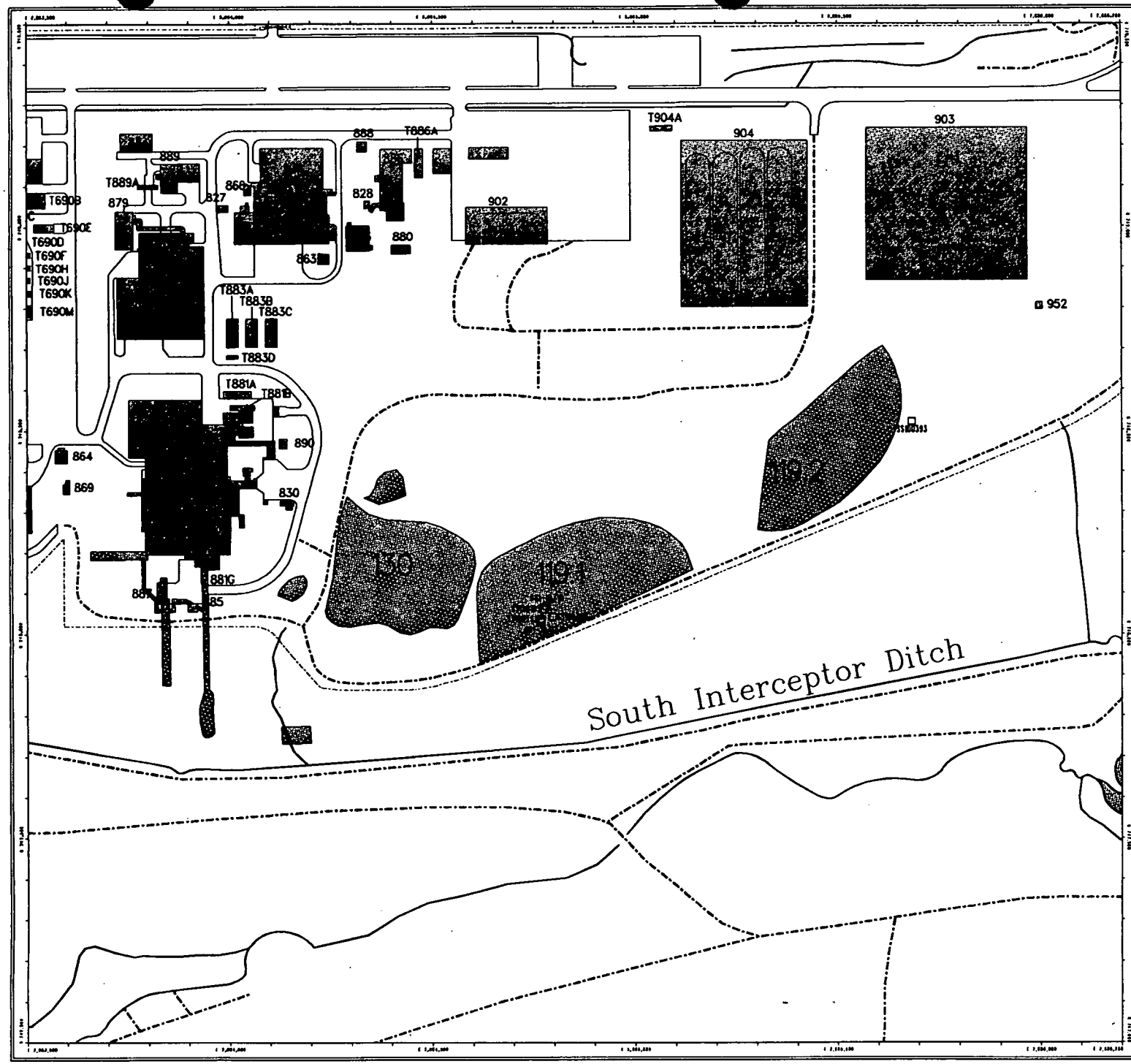
This Sampling and Analysis Plan will address the required sampling, quality assurance/quality control (QA/QC) and analytical requirements needed to verify the removal of the hot spots and for characterization of the excavated material. The six hot spots can be located on Figure 1-1 and are designated as locations 881-16/17, 881-18/19, SS100193, SS100293 and SS100493 in IHSS 119.1 and as SS100393 near IHSS 119.2.

2.0 OBJECTIVE AND SCOPE

The objective of this Sampling and Analysis Plan (SAP) is to identify the specific analytical needs, sampling requirements, data handling requirements and associated quality assurance/quality control (QA/QC) requirements for completion of the hot spot removal. More specifically, this includes the completion of two main objectives, they are:

- to confirm the radiological portion of the hot spot has been removed or significantly reduced, and
- to generate adequate and defensible information to characterize the material removed from the hot spot for treatment, storage and/or disposal purposes.

It should be noted that this removal action is not intended to remove all radiological contamination or to be a final action for the specific IHSSs. The objectives of the removal action are to remove radionuclide contamination from the six areas to a depth of approximately twelve to thirty six inches below surface (based on the data from the



881 Hillside Area Operable Unit No. 1

OU-1 Hot Spot Removal Project

Figure 1-1

EXPLANATION

- "Hot Spot" Sampling Location
- OU-1 IHSS location
- Buildings or other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Paved roads
- Dirt roads

DATA SOURCE:
Surface and locations are per the field survey sheets.
Buildings, roads, and fences provided by FastMaps Engr., EG&G Rocky Flats, Inc. - 1991.
Hydrology provided by USGS - (date unknown)

Scale = 1 : 4166
1 inch represents 345 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

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MAP ID: OU1-88-94002-01 August 17, 1994

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Supplemental Surficial Radiological Characterization). An estimated 0.5-1.5 cubic yards of material may be generated from each hot spot. Confirmation samples will then be collected from the excavated area for fixed-lab radiological analysis.

If subsurface contamination (based on field instrument measurements) cannot be removed within the approximate volumes identified (i.e., approximately 0.5-1.5 cubic yards per hot spot), the field operations manager will determine the need to continue excavation based on the conditions observed, the amount of material already excavated and field instrument readings. In any event, the removal will be carried out in a manner that ensures the removal of contaminated soil from the top twelve to thirty six inches of the soil profile in the identified areas. The excavated material will then be sampled for characterization purposes prior to being placed into drums.

Based on the objectives described above, the scope and contents of this SAP will include:

- Defining appropriate field methods and screening criteria
- Identifying the locations and number of samples to be taken
- Collecting and analyzing of radiological confirmation samples
- Describing the analytical requirements and appropriate sampling methods
- Developing QA/QC requirements including data quality objectives
- Generating adequate information for characterization, storage and/or disposal purposes

3.0 SAMPLING APPROACH AND REQUIREMENTS

The planned removal action will consist of simple excavation of contaminated surface and shallow subsurface soil. The removal will be conducted by trained Rocky Flats Environmental Technology Site staff equipped with appropriate personal protective equipment. The excavation will be conducted using simple hand tools, or a backhoe if necessary, while applying aggressive dust control measures, including area spraying with water, to prevent contaminant migration during the excavation (per Paragraph 2.1.2.2 of the Plan for the Prevention of Contaminant Dispersion, DOE, February 1992). The excavated material will be immediately placed in lined steel drums after removal and the drums will be closed and transferred to interim storage. Excavation will continue until the remaining soil exhibits background levels of radioactivity. This will be measured with an appropriate field survey instrument.

The removal action will require a three step approach to sampling and data collection. The first step is to screen the excavation and immediate area for radiological contamination prior, during, and after excavation. The second step is to collect confirmation samples to substantiate the removal of the radiological portion of the hot spot. The third step is to collect samples of the excavated media for characterization of the removed materials for treatment, storage and/or disposal purposes.

3.1 Field Screening of Excavated Area

The field screening of the excavated area will be conducted in a three stage approach.

The first stage, prior to the commencement of excavation activities, consists of surveying the excavation sites with a truck mounted High Purity Germanium (HPGe) detector to provide a baseline for radioisotopic contaminant levels.

The second stage consists of hand-held radiation detector surveys to determine the removal of gross contamination during excavation. A Field Instrument for Detection of Low Energy Radiation (FIDLER) will be used for this application. After removal of each six-inch thick layer of soil from the contaminated area, the FIDLER will be used to measure the residual activity in the sides and bottom of the excavation (per procedure FO.16 "Field Radiological Measurements"). The readings will be compared to a predetermined background reading. The local background for each hot spot location will be established by taking ten FIDLER readings of the surrounding background soil at each location, and determining a mean and standard deviation for each location. The acceptable background range will be the mean of the location, plus or minus two standard deviations, giving a 95% confidence level that the mean of the background reading of the ten surveys is the true background of the specific hot spot location. Excavation will continue until the residual activity measured with the FIDLER is at or near the background level.

The third stage of the field screening will again utilize the truck mounted HPGe detector. After all radiological contamination that can be detected by the FIDLER has been removed, an additional 2-6 inches of material (depending upon whether a shovel or a backhoe is used) will then be removed from the excavation to ensure contaminant removal. FIDLER screening will be run again at this time to ensure background or near background levels have been reached. The excavation will then be surveyed with the HPGe using a one-hour count duration (using procedures 5-

21000-OPS-GT 27 - Autonomous Operation of Global Positioning Equipment; 5-21000-OPS-GT 28 Differential Operations of Global Positioning Systems; 5-21000-OPS-GT 29 - Real-time Differential Operations of Global Positioning Systems; and 5-21000-OPS-GT 30 - In Situ Characterization). In addition, a background reading will be taken using the HPGe in order to compare radionuclide activity levels between the excavation and background.

3.2 Collection of Radiological Confirmation Samples

Field sampling personnel will collect confirmatory soil samples after the excavation is completed and field radiation monitoring instrument (FIDLER) indicate background (or near background) readings at the surface, bottom and sides of the excavation. Four confirmation soil samples will be collected from each of the excavations in accordance with procedure GT.08 "Surface Soil Sampling". These samples will be used to confirm the removal of radiological contamination from the excavation. Therefore, the samples will be discrete grab samples and will only be analyzed for radionuclides. The number of confirmation samples needed was determined by using the EPAs Decision Error Feasibility Trials (DEFT) software version 3.01 (EPA, 1994) and an input parameter of 95% for the confidence level.

The excavations remaining after soil removal are expected to be generally hemispherical in shape with a diameter ranging from three feet to five feet and a depth of twelve to thirty six inches. The radiological confirmation samples will be collected in a simple random manner as described in chapter 9 of SW-846 (EPA, 1986). The confirmation sampling will be conducted by laying out a grid over the excavation and then collecting samples randomly from the excavation. The grid will have segments that are 12"x12" and will be laid out over the excavation using string and small pegs or nails. The random locations will be designated by using a die to roll the random coordinates. The X coordinate will be determined first followed by the Y coordinate. The samples will then be collected from the centers of each designated random cell. If the excavation is larger than 6 feet on any side, then the grid spacings will be expanded accordingly (18 inches etc.). An example of this grid strategy is shown in Figure 3-1.

The results of the confirmation sampling will be compared to pre-excavation sample results in order to confirm the degree of risk reduction which has been achieved. This

will be accomplished by comparing contaminant concentrations from both pre- and post-excavation levels. This information will then be compiled in the final report.

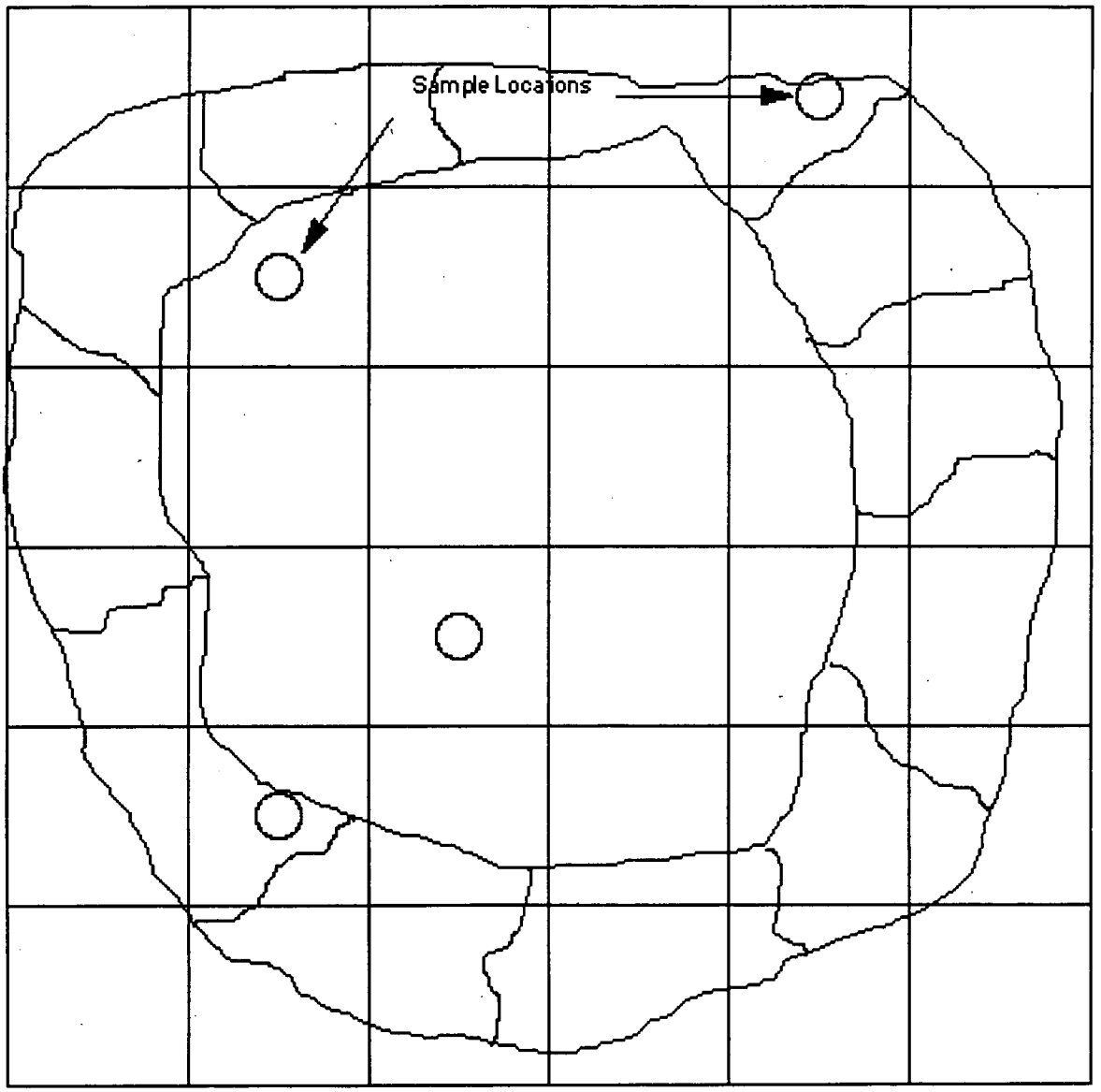
3.3 Collection of Characterization Samples

Field sampling personnel will collect samples of the excavated material for characterization purposes. One sample will be collected from each drum to characterize the material after containerization of the excavated material, up to three drums per sampling location. The first three drums from any sampling location will be sampled. After the first three drums are filled, all odd numbered drums from any sampling location will be sampled, (i.e. drum number five, drum number seven, etc.). The samples of excavated material will be collected as a composite (procedures L-6245, "Sample Procedures for Waste Characterization" and L-3306, "Waste Sampling in PA") for Semi-Volatile Organic Analysis (SVOA), polychlorinated biphenyls (PCBs)/pesticides, metals, radionuclides, reactivity, soil pH, Total Organic Halides (TOX) and Toxicity Characteristic Leaching Procedure (TCLP). These samples will be collected using a hand auger and composited from the drummed material. The Volatile Organic Analysis (VOA) samples, and TCLP VOA samples will be collected as discrete grab samples (not composite) from the bottom or middle of each drum. Five 2 pound (1 kilogram) samples will be collected from the drummed material for shipment to Envirocare for waste acceptance analysis after validated characterization data has been received. All drums will be required to go through Real Time Radiography (RTR) screening for liquid content.

3.4 Sample Collection and Handling

The collection of all samples will be in accordance with the appropriate procedures as described above. The collection of samples will also follow procedure FO.13 "Containerization, Preserving, Handling and Shipping of Soil and Water Samples", for the containerization, preserving, handling and shipping of environmental samples. The screening of samples for shipment will follow procedure FO.18 "Environmental Sample Radioactivity Screening" prior to shipment. In the event the samples are "hot" procedure FO.25 "Shipment of Radioactive Materials Samples" will be used for sample shipment. Table 3-1 defines the number of specific samples to be collected for each activity including QC samples.

Figure 3-1 Conceptual Excavation and Sampling Grid



4.0 ANALYTICAL REQUIREMENTS

The analytical specifications for this project will follow the protocol described in the General Radiochemistry and Routine Analytical Services Protocol (GRRASP) (EG&G, 1993b). The GRRASP describes the protocol for analytical methods that will be used, detection limits, holding times, laboratory COC, extraction/preparation criteria and reporting requirements.

4.1 Data Needs

The data needs for this project include the collection of sufficient information of adequate quality to meet the specific objectives of the project. As described above, this includes characterization of the excavated material for RCRA constituents, confirmation as a Low Level Waste (LLW), requirements for Land Disposal Restriction (LDR) criteria and the collection of radiological confirmation samples for the removal action. The quality requirements for the removal action are described in the data quality objectives section of the QAA.

4.2 Analytical Methods

The analytical methods that will be used for this project can be found in Table 3-1. Note this table also includes the total number of samples that will be analyzed by each method, including field QC samples. The actual analytes for each method are included as a part of the QAA.

Table 3-1 Estimated Number of Samples and Analytical Methods

Number of Samples	Analytical Method / Instruments	Analytes	Type of Sample
13	SW-846 8240	VOAs	Waste Characterization (10) Duplicate for Waste Characterization (1) Trip Blanks for Characterization (2)
11	SW-846 8270	SVOAs	Waste Characterization (10) Duplicate for Waste Characterization (1)
11	EPA-CLP TAL List	Metals	Waste Characterization (10) Duplicate for Waste Characterization (1)
11	SW-846 8080/8150	PCB/PEST/HERB	Waste Characterization (10) Duplicate for Waste Characterization (1)
11	9030/9010	RCRA Reactivity Cyanide/Sulfide	Waste Characterization (10) Duplicate for Waste Characterization (1)
11	SW-846 9045	Soil pH	Waste Characterization (10) Duplicate for Waste Characterization (1)
11	SW-846 6010/7000	TCLP Metals RCRA 8 only	TCLP for Waste Characterization (10) Duplicate TCLP for Waste Characterization (1)
11	SW-846 8240A/8270	TCLP Organics	TCLP for Waste Characterization (10) Duplicate TCLP for Waste Characterization (1)
11	SW-846 8080/8150	TCLP PCB/PEST/HERB	TCLP for Waste Characterization (10) Duplicate TCLP for Waste Characterization (1)
11	SW-846 9020	TOX Analysis	TCLP for Waste Characterization (10) Duplicate TCLP for Waste Characterization (1)
39	GRRASP Specific	Radiological Screening	Radiological Screening for Shipping (39)
39	GRRASP Specific	Pu-239, 240	Radiological Characterization (10) Duplicate for Radiological Characterization (1) Radiological Confirmation (24) Duplicates for Confirmation (2) Rinsate (2)
39	GRRASP Specific	Am-241	Radiological Confirmation (24) Duplicates for Confirmation (2) Rinsate (2) Radiological Characterization (10) Duplicate for Radiological Characterization (1)
39	GRRASP Specific	U-233, 234, 235, 238	Radiological Confirmation (24) Duplicates for Confirmation (2) Rinsate (2) Radiological Characterization (10) Duplicate for Radiological Characterization (1)
39	GRRASP Specific	Gross Alpha and Beta	Radiological Confirmation (24) Duplicates for Confirmation (2) Rinsate (2) Radiological Characterization (10) Duplicate for Radiological Characterization (1)

5.0 DATA MANAGEMENT REQUIREMENTS

The specific data management requirements for this SAP are defined and described in Appendix A, "Data Management Plan" (DMP). This DMP will be followed for all data collection, compilation and dissemination activities for this project.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

The specific Quality Assurance/Quality Control requirements for this SAP are defined and described in Appendix B, "Quality Assurance Addendum" (QAA). This QAA will be followed for all QA/QC activities for this project.

7.0 REFERENCES

EPA 1994, Data Quality Objectives, Decision Error Feasibility Trials (DEFT), Version 3.01, March, 1994.

EPA 1986, Test Methods for evaluating Solid Waste: Physical/Chemical Methods; Third Edition (SW-846)

EG&G 1993a, Special Report, Operable Unit-1, Supplemental Surficial Radiological Characterization, 1993.

EG&G 1994, Final Phase III RCRA Facility Investigation/Remedial Investigation, RFP 881 Hillside Area (Operable Unit No. 1)

EG&G 1993b, General Radiochemistry and Routine Analytical Services Protocol (GRRASP)

ENVIROCARE of Utah, Material Acceptance Process Manual

FINAL
OU-1 SAMPLING AND ANALYSIS PLAN
APPENDIX A - DATA MANAGEMENT PLAN
HOT SPOT REMOVAL

Rocky Flats Environmental Technology Site
(Operable Unit No. 1)

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

September, 1994

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1.0 INTRODUCTION

The purpose of this Data Management Plan (DMP) is to support the Sampling and Analysis Plan for the Operable Unit No. 1 (OU-1) Hot Spot Removal project and to identify the mechanisms and procedures for the efficient and accurate transfer of data from collection/generation of the data through its end-use. This is achieved by identifying the sources of data, establishing systematic procedures for quality control/quality assurance, and creating a suitable database to allow end users the appropriate access to meet project requirements and to establish appropriate security and back-up measures to ensure data integrity. The DMP identifies and defines sample documentation, sample tracking, data entry, data proofing, data reporting, and data management personnel responsibilities.

The OU-1 hot spot removal project will involve the collection and analysis of data from several sources:

- Screening parameters collected manually including organic vapor concentrations and radiological screening.
- Initial screening samples analyzed off-site for shipping purposes.
- Tangible analytical data generated from off-site laboratory testing of confirmation soil samples collected from the boundary of the excavation.
- Characterization sample analysis of the excavated waste from the Rocky Flats Environmental Database System (RFEDS.)

This DMP has been developed to promote the proper and complete management of scientific and technical data that will be generated from the OU-1 hot spot removal activity. The primary purpose of a DMP is to communicate to personnel collecting, using, and managing information how it will be recorded, stored, accessed, and reviewed. Procedures are defined and implemented to ensure that data are collected, entered, and stored in a secure, controlled, and retrievable manner to accurately and efficiently transfer data into useful information. This plan addresses the planning, implementation, and responsibilities to optimize data management and use of the RFEDS and the interim database, Datacap.

This DMP focuses principally on the data management and data handling. Detailed discussion of peripheral activities (i.e., field data collection methods etc.) are described in the main portion of the Sampling and Analysis Plan (SAP). RFEDS will be the ultimate repository for all data generated during this project.

Tracking and verification of data at each stage of the project is important. The data tracking procedures identified in this DMP vary according to the data collection method employed. Figure 1-1 provides a summary of the data sources and the flow of the data.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

Support staff for the data management tasks includes all personnel involved in data acquisition, quality control (QC), and data processing. The designated staff are responsible for implementing and carrying out data management activities according to this plan. All personnel shall be qualified to perform the tasks assigned to them.

The primary personnel responsible for data management are the EG&G Project Manager, Sample Crew Personnel, Sample Manger, Qualified Technical Reviewer, Field Data Manager, RFEDS User System Manager (USM), Data Verifier and Project Quality Assurance/Quality Control (QA/QC) Officer. The responsibilities for these positions are summarized in the following sections.

2.1 EG&G Project Manager

The EG&G Project Manager will be responsible for ensuring that all data are collected, processed, and stored in a manner consistent with this DMP and in compliance with 5-21000-OPS-FO.14 "Field Data Management". Data management support personnel will report to the EG&G Project Manager with any problems that may impact the integrity of the data and/or the removal action.

Prior to sample collection, the EG&G Project Manger shall:

- Coordinate sample shipping with the Lockheed Analytical Labs, or other analytical lab;
- Obtain RFEDS assigned sample numbers and location codes from the RFEDS USM to use on the Chain of Custody (COC) forms.

After sample collection, the EG&G Project Manager shall:

- Manage any feedback from the contract laboratory;
- Ensure that any data from sample locations that have been surveyed are given to the RFEDS GIS group;
- Ensure that the appropriate authenticated quality-related records and Administrative Records are transmitted to the Central Records Center.

2.2 RFEDS User System Manager

The RFEDS User System Manager will, prior to sampling:

- Verify all locations of samples to be taken and assign any new location codes to sample locations;
- Assign sampler numbers, COC numbers and any applicable codes and abbreviations for the EG&G Project Manager.

After sampling, the RFEDS USM will:

- Verify any transmitted records for accuracy and completeness;
- Ensure the data is preserved, retrievable, traceable, and available for response to regulatory agency requirements.

2.3 Sample Crew Personnel

The Sample Crew Personnel will be responsible for field data collection. Their tasks include:

- Completing all applicable entries on appropriate FO.14 forms;
- Documenting all field observations and data on field data forms;
- Recording field observations and data with black waterproof ink;
- Delivering field data forms and corresponding COCs to the Sample Manager by the end of each day of field operations.

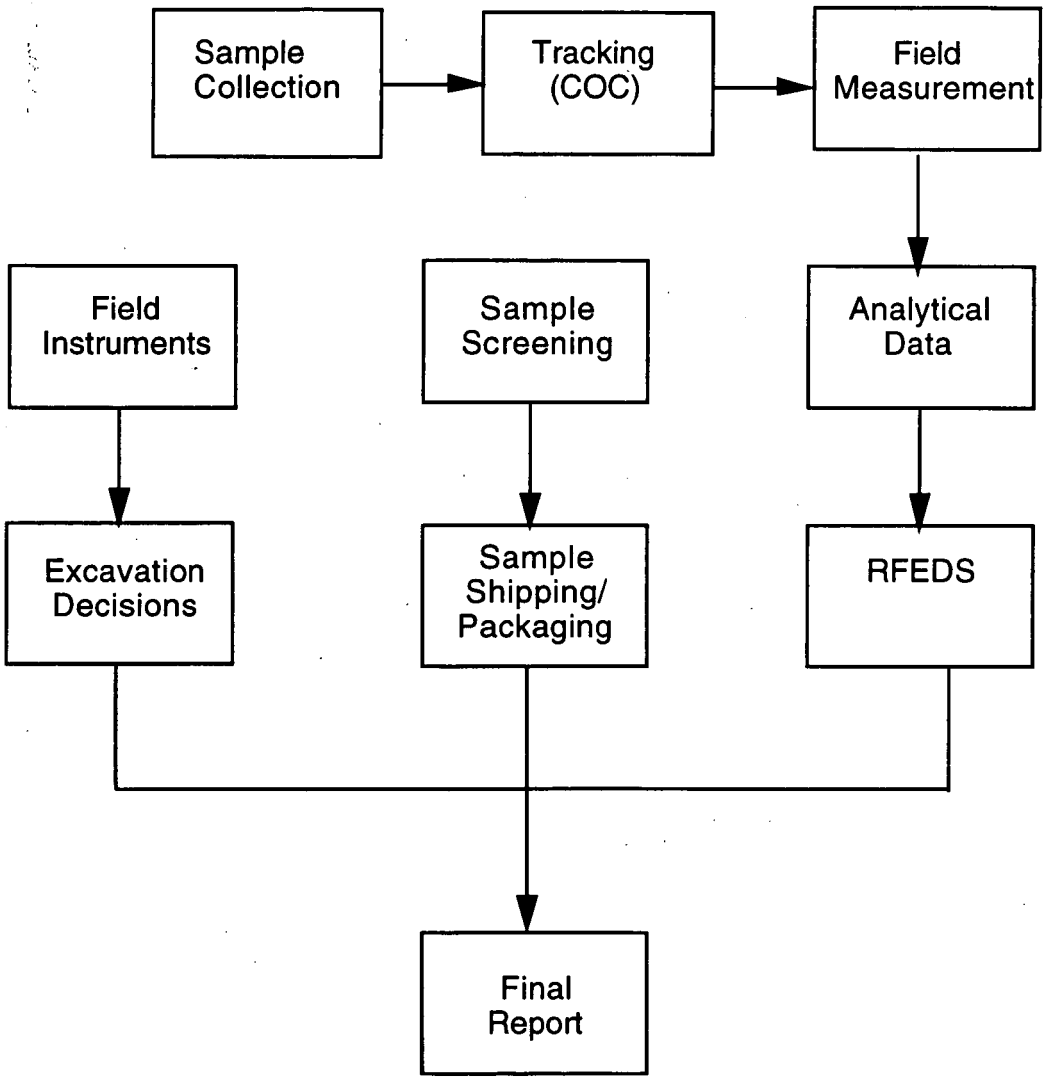
2.4 Sample Manager

The Sample Manager is responsible for:

- Receiving field data forms daily and reviewing for completeness and verifying that all forms have been received;
- Resolving any discrepancies with Sample Crew Personnel and clearly documenting any corrections, change, or insertions made as a result of discrepancy resolution;

Figure 1-1

SUMMARY OF DATA SOURCES AND DATA FLOW



- Verifying that the COCs are complete, accurate and error-free. When the COCs are complete, accurate and error-free, and before samples are shipped to the contract laboratory, the Sample Manager will copy all COCs on a daily basis and place copies in T891E;
- Transferring the field data to the Field Data Manager to for input into Datacap.

2.5 Qualified Technical Reviewer

The Qualified Technical Reviewer performs a technical verification of the data, including:

- Reviewing field data to ensure consistency with known chemical and physical properties of the media being sampled.
- Verifying all calculations, reported units and all data on all forms.
- Verifying that the correct number of Quality Control samples were collected.
- Resolving any discrepancies with Sampling Crew Personnel and clearly recording any and all corrections, changes, or insertions made as a result of discrepancy resolution.
- Ensuring that documentation of the verification of data in this record includes the date of verification and the initials of the verifier.

2.6 Field Data Manager

The Field Data Manager is responsible for:

- Entering any relevant field parameters into the appropriate Datacap module.
- Entering the COC/tracking information into the Tracking section of Datacap within two days of sample shipment to the analytical laboratory.
- Printing data from Datacap and giving to the Data Verifier for review.
- Verifying that all samples intended to be collected are in Datacap.
- Transmitting field information, sample collection data and COC tracking data to the RFEDS USM.
- Backing up and ensuring the security of Datacap.

2.7 Data Verifier

The Data Verifier will:

- Compare the original field data forms and Datacap printout for consistency and accuracy.
- Report any transcription errors and return to data entry for correction.

2.8 EG&G Sample Management GIS Group

The E&G Sample Management GIS Group receives surveying and sample data information from the EG&G Project Manager and digitizes the data.

2.9 Project QA/QC Officer

The Project QA/QC Officer will ensure that procedures are carried out in accordance with this DMP. The QA/QC Officer will report to the EG&G Project Manager or designee.

3.0 DATA HANDLING SYSTEMS EQUIPMENT, DATA BACKUP, AND SECURITY PROCEDURES

3.1 Hot Spot Removal Data Handling and Storage Systems

The OU-1 hot spot removal data handling and storage system will handle and store data including: field data forms for the field instrumentation (i.e., FIDLER, HPGe, HNu, etc.), laboratory screening data, and laboratory generated data from RFEDS. The raw data will be manually input into Datacap, an interim database in Microsoft Excel, by the Project Manager, Project Data Manager, or designee. Datacap is run on a PC with sufficient memory and co-processors. Datacap is a temporary database used to store the field data in an easily-retrievable manner and in a manner easily recognizable by the RFEDS database, ORACLE in order to ensure completeness and accuracy prior to data transfer to RFEDS. Datacap will also store waste characterization analysis data that will be downloaded from RFEDS.

Datacap is able to generate appropriate reports and tables, provide systematic review, and efficient access and retrieval to optimize data use after downloading from RFEDS or manual input. It is recognized that different types of data (e.g., physical and

chemical parameters together with associated location information) from a variety of sources will be collected at various times.

The RFEDS data system is capable of managing fundamental sample data, reports, queries, and exports of the data. RFEDS is amenable to reporting either all or part of the data in selected fields. Furthermore, all or any subset of the data can be selected for review and analysis. RFEDS has the capability to export data to numerous personal computer applications, such as Wordperfect, Autocad, Lotus, Stratigraphics, and Stanford Graphics, and can be transferred in ASCII, Microsoft Excel, or DBASE III-compatible file formats.

3.2 Database Backup

3.2.1 Field Data Acquisition, Backup, and Security Procedures

Data manually acquired in the field will be directly entered onto the appropriate forms as raw data and will be subsequently entered into Datacap. A hard copy of the most recent version of the data will be kept with the data disks. The original data will be kept in an orderly manner in the EG&G Project Manager's office. Data generated by the HPGe instrumentation will be provided on disk in Excel format. Copies of all data collected, both disk and hard copy, will be sent to the Field Data Manager upon completion. The Sample Manager will be responsible for transmittal of the field data to the Field Data Manager.

3.2.2 Backup and Security Procedures

To limit the likelihood of data corruption and maintain the integrity of the database, only the EG&G Project Manager and the Field Data Manager will have unlimited access to the data by means of password protection. The Sample Manager will have entry/edit/query access. The individual user access privilege level will be designated by the EG&G Project Manager and the Field Data Manager. General user access for the hot spot removal database will be to query the chemical and field information. Data editing will be performed by the RFEDS USM, the Field Data Manager, or their designees. It is also anticipated that once data are loaded, little or no changes to the data are expected. Any modifications to the data must receive the authorization of the Field Data Manager. Changes to the data will be documented as described in Section 5.0 of this DMP, "DATA MANAGEMENT, DATA TRACKING, DATA ENTRY AND DATA PROOFING."

The RFEDS User System Manager or other RFEDS group member will back up RFEDS daily onto tape. This level of backup is considered to be sufficient for the OU-1 hot spot removal database. The Field Data Coordinator is responsible for backing up any data generated in the field by photocopying hard copies and backing up Datacap data daily to disk or tape.

4.0 DOCUMENTATION

4.1 Data Acquisition Documentation

It is necessary to record detailed information so that data acquisition can be reconstructed. The Scientific Notebook System (SNS) is one of the primary mechanisms for data acquisition. Any data that are collected using non-standard procedures will be collected in accordance with the SNS and documented in the scientific notebook. Data for the OU-1 hot spot removal project will be compiled from a number of different sources. At a minimum, the scientific notebook, electronically collected data records, field instrument data, and sample collection forms should include the following information for each data or sample point:

1. Field sample identification (ID)
2. Date and time of sampling/measurement
3. Sample measurement location
4. Sample measurement description
5. Sample depth (if appropriate)
6. Parameters or analyses being reported
7. Associated quality control (QC) samples (e.g., duplicates, matrix spikes, etc.)
8. Approximate levels (in counts/minute, ppm etc...) of contaminates as reported by field instrumentation

4.2 Transmittal of Field Data to Field Data Manager

All data generated in the field will be copied and transferred to the Field Data Manager or designee. This data will include chain-of-custody (COC) forms, field notes, data generated by field instruments (i.e., FIDLER, HPGe, HNu, etc.), and any other data generated in the field. Following shipment of data from the field to the Field Data Manager or designee, the Sample Manager will verbally confirm the data have been received. The field data will be transferred to Datacap database by the Field Data

Manager/EG&G Project Manager or designee. The data will then be transmitted to the RFEDS USM via diskette.

4.3 Data Receipt Confirmation

Upon receipt of the data, the Field Data Manager is responsible for checking, at a minimum that:

1. All data were received and the receipt was noted on the Field Data Transmittal Form.
2. The data received matches the data acquisition plans.
3. The appropriate field QC checks were performed (calibration of instruments etc.)

The Field Data Manager will have the responsibility of ensuring that discrepancies identified during the checking process are corrected and documented.

5.0 DATA MANAGEMENT – DATA TRACKING, DATA ENTRY, AND DATA PROOFING

5.1 Manually Collected Field Data

Data collected manually will consist of field measurements from the FIDLER probe, HPGe detector, and HNu. Figure 5-1 summarizes the data flow for the manually recorded data from collection through data reporting. The results and other pertinent information will be recorded on the appropriate data collection forms (Figures 5-2, 5-3, and 5-4), including FO14.C "Soil Sample Collection Form." The results from the forms will be entered into PC data system. The data entry will be QC reviewed by the Project Data Manager prior to entry of the data.

Figure 5-1

MANUAL DATA COLECTION SYSTEM FLOWCHART

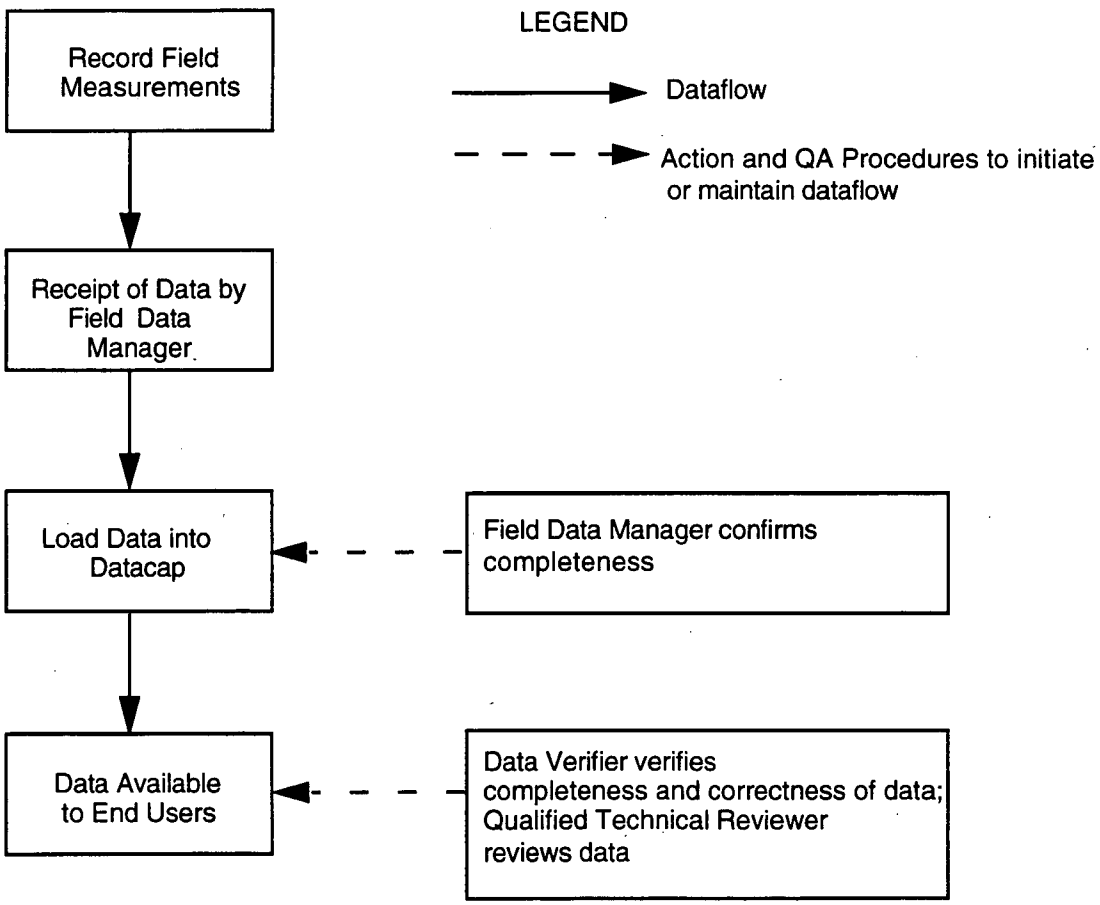


Figure 5-2
FIDLER MEASUREMENT FORM

1. Monitoring Location: _____ Date: _____

2. Equipment Information and Background Measurements

Manufacturer and Model No.	Serial Number	Calibration Date	Background Reading	Units (CPM)

3. FIDLER Measurements

Sampler Initials	Time (military)	FIDLER Reading (CPM)	Depth (inches)

Figure 5-3
HNu MEASUREMENT FORM

1. Monitoring Location: _____ Date: _____

2. Equipment Information and Background Measurements

Manufacturer and Model No.	Serial Number	Calibration Date	Background Reading	Units (ppm)

3. FIDLER Measurements

Sampler Initials	Time (military)	HNu Reading (ppm)	Depth (inches)

Figure 5-4
SAMPLE COLLECTION FORM

Sample Collection Form

Project Number	:		
Sample Number	:		Type: SS
Contractor	:		
Station Code	:		
Collection Date	:	Quarter:	Disposition:
Collection Time	:	Purpose:	
Sample Location	:		
Composite (Y/N)	:		
Composite Desc	:		
QC Type	:	Partner:	
Collection Method	:		
Sample Team Leader	:		
Member	:		
Member	:		
Volume Collected	:	Units:	
Prepared By	:		

Surface Soil Sample Form

Depth of Take	:	Start (in.)	End (in.)
Headspace Reading	:		
Comments			

Sample Crew Member: _____
Print Name

_____
Signature Date

5.2 RFEDS Analytical Data

Figure 5-5 summarizes the data flow for the analytical data. Analytical data will be obtained from RFEDS in electronic format. The data will be checked by the Data Verifier for format correctness and completeness. The RFEDS analytical data will be downloaded into Datacap to allow an end user to easily query the data from the database. Upon completion of downloading, the RFEDS USM will review the data for completeness in comparison to plan.

5.3 Data Entry

Data can be entered in two ways: (1) manual entry from data collection forms and analytical data sheets, and (2) data electronically downloaded from RFEDS.

5.3.1 Manual Data Entry

Manual data entry will be followed by a 100 percent data review by the Data Verifier. Errors will be researched and corrected. A hard copy of the manually entered data will be initialed and dated by the person performing the review.

5.3.2 Corrections and Changes to Sample Data

Changes or corrections may be required in the data stored in Datacap. All changes must be accompanied by a Data Correction/Change Form (Figure 5-6). The form will detail the changes to be made and document that the changes were completed. Corrections to the database will be reviewed by the Field Data Manager or designee for potential entry errors.

Figure 5-5

DATA FLOW FOR ANALYTICAL DATA

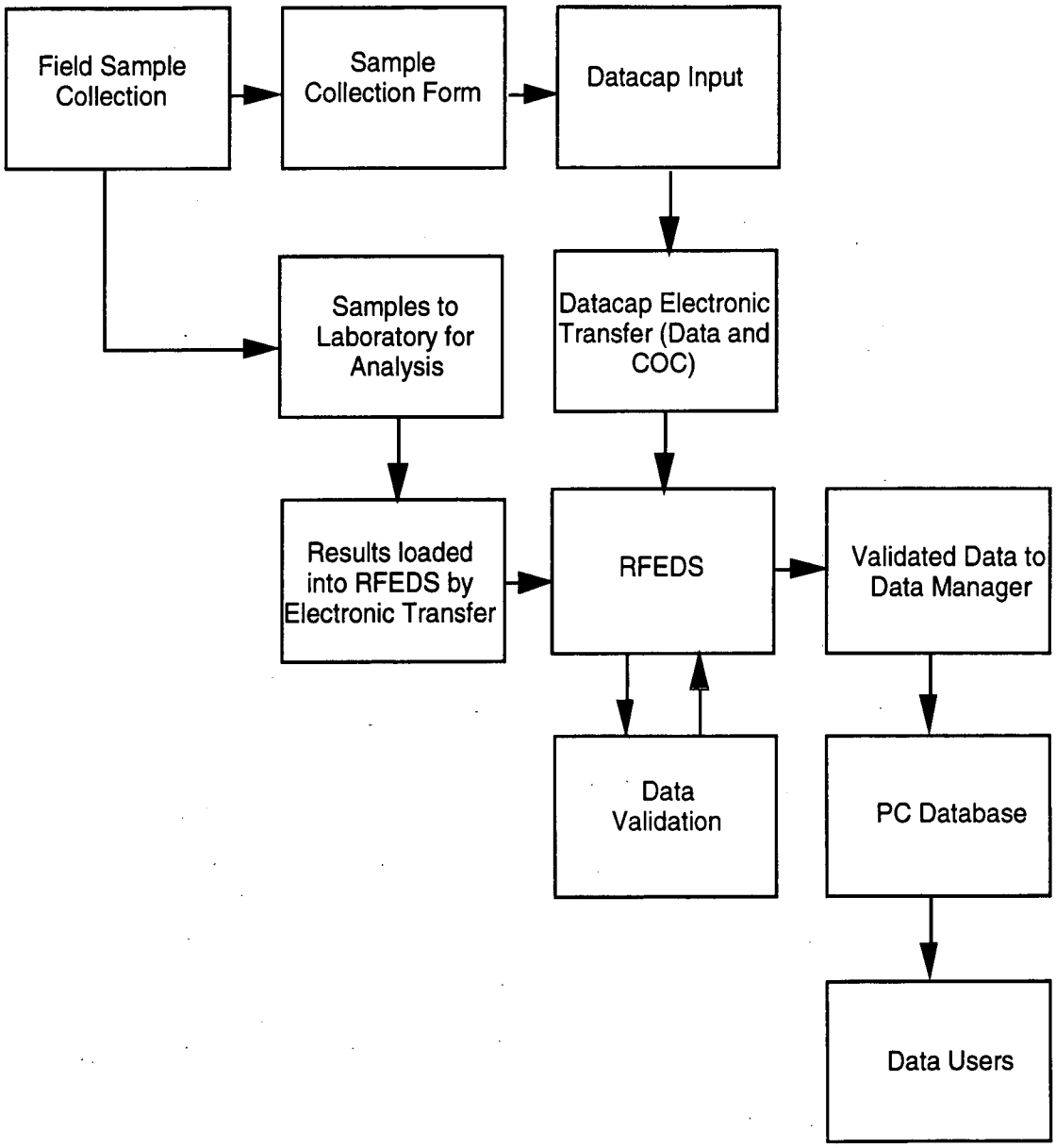


Figure 5-6
DATA CORRECTION/CHANGE FORM

The following changes and/or corrections to the database are required (check all that apply):

_____ Data qualifiers have been assigned to the attached sample data

_____ The following sample analyses have been changed:

_____ Other changes or corrections (describe below):

Changes Requested By: _____ (Print Name) _____ (Signature) _____ (Date)

Changes Made By: _____ (Print Name) _____ (Signature) _____ (Date)

Changes Checked By: _____ (Print Name) _____ (Signature) _____ (Date)

5.4 Data Verification/Technical Review

Problems encountered in data management are typically due to inconsistencies or errors in the data reporting. The field data in the database will be verified by the Data Verifier, comparing a printed hard copy from the database to field forms using the procedures in RFP Procedure 5-21000-OPS-FO.14, Field Data Management, Section 7.5. Typical errors that are found include, but are not limited to, the following:

1. Incorrect field sample numbers
2. Duplicate data and samples
3. Improper parameter names
4. Samples with missing data
5. Missing samples
6. Incorrect sample collection data
7. Incorrect units
8. Incorrect qualifiers
9. Missing detection limits, as applicable
10. Incorrect number of significant figures reported
11. Incorrect recording of times
12. Inconsistencies in the sequences of data collection

Data will be checked for transcription errors, accuracy and to ensure that all samples that were intended to be collected were collected, shipped and entered into Datacap, and that any samples that were intended to be collected, but not collected were clearly noted, verified and entered into Datacap.

It is important that data inconsistencies and errors be identified as soon as possible to allow for correction prior to data use. To track the number of data points, samples, and analyses requested, it is important that all data (whether they are physical, chemical, or other parameters) be recorded and checked to verify that the data collected meet the project requirements.

5.5 Final QC Review

The following data final QC review procedures are applicable to all data acquisition for the project. These procedures are designed to ensure the final database in RFEDS is complete and correct.

1. Complete database (RFEDS and Datacap) QC review. A hard copy of the database, organized by location, will be verified by the Field Data Manager or designee.

2. Clearly mark corrections to the hard copy database report in red ink.

3. Using the data entry sheets and sample collection sheets, check that data identifications are correctly listed on the database hard copy, and the number of data points or number of samples for the removal are reported on the database hard copy.

4. Check that all the parameters requested for each analysis are reported on the database hard copy and that units reported on the database hard copy are correct.

5. Check that data time sequences are correct.

6. Check values for all manually collected parameters reported from the database against the field collection forms, at a frequency of approximately 10 percent of the data for each test. If errors are found, an additional 10 percent of results will be checked for similar errors. If errors are found in the second 10 percent, all results will be checked.

7. Check the corrected copy of the database to determine that corrections have been completed (i.e., verify the final hard copy of the database).

8. The data will then be reviewed by a scientist familiar with the project objectives and data collection activity (Qualified Technical Reviewer) for data that do not make scientific sense (i.e., a concentration value of 2,000,000 mg/kg).

9. Following completion of the QC procedure, the EG&G Project Manager, in consultation with the Project QA/QC Officer and Field Data Manager, will change the database reporting status to "FINAL."

FINAL
OU-1 SAMPLING AND ANALYSIS PLAN
APPENDIX B - QUALITY ASSURANCE ADDENDUM
HOT SPOT REMOVAL

Rocky Flats Environmental Technology Site
(Operable Unit No. 1)

U.S. DEPARTMENT OF ENERGY

Rocky Flats Environmental Technology Site
Golden, Colorado

September, 1994

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1.0 PURPOSE

This Appendix consists of the Quality Assurance Addendum (QAA) for the "Operable Unit No. 1 (OU-1) Sampling and Analysis Plan for Hot Spot Removal." The purpose of the QAA is to identify quality assurance (QA) requirements and specific measures for implementing these requirements, that are applicable to the sampling of hot spots (radiologically contaminated spots) found at six locations within Operable Unit No. 1.

This QAA is intended to supplement the *Rocky Flats Environmental Technology Site Site-Wide Quality Assurance Project Plan for CERCLA Remedial Investigation/ Feasibility Studies and RCRA Facility Investigations/Corrective Measures Studies Activities* (referred to as the RFP Site-Wide QAPjP, or simply QAPjP). As a supplement to the QAPjP, this QAA establishes the site-specific measures and QA controls applicable to the actions described in this Sampling and Analysis Plan (SAP).

2.0 SCOPE

This QAA addresses all quality-related activities as described in the SAP to be performed by EG&G Rocky Flats (EG&G); other organizations (subcontractors) shall implement similar QA programs under the auspices of the Department of Energy Rocky Flats Field Office's direction (DOE/RFFO).

The major actions within this SAP, to which this QAA applies, include:

- Defining data quality objectives
- Gathering of field data
- Sample collection
- Sample handling and shipping
- Excavation
- Data Analysis

3.0 BASIS FOR TECHNICAL ACTIVITY

The work outlined in the OU-1 Sampling and Analysis Plan for Hot Spot Removal is to identify the specific analytical needs, sampling requirements, data handling requirements and associated QA/QC requirements for the completion of the hot spot removal. This includes the completion of the two main objectives, which are; 1) to confirm the radiological portion of the hot spots have been removed or significantly reduced, and 2) to generate adequate and defensible information to characterize the material removed from the hot spot for treatment, storage and/or disposal purposes. The work specifically supports the verification, confirmation, and characterization of radiologically contaminated areas within OU-1.

4.0 BASIS OF QUALITY ASSURANCE REQUIREMENTS

The QAPjP was prepared to identify the QA requirements and methods applicable to the RFP Environmental Restoration (ER) Program activities, as identified in the Attachment 2 of the IAG Statement of Work. Section IV.A of the IAG specifies the minimum quality elements that the QAPjP must include, and references EPA QAMS/005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans,* for guidance in preparing the QAPjP.

5.0 QUALITY REQUIREMENTS

The following outlines the quality requirements for the OU-1 Sampling and Analysis Plan for Hot Spot Removal.

5.1 Organization and Responsibilities

The EG&G Environmental Restoration Management (ERM), OU 1 Closure group is responsible for the overall coordination of the OU 1 Hot Spot Removal Project. Other organizations such as the internal sampling management group and the subcontracted external laboratory will be involved with this work. Responsibilities of other organizations will be assigned by the OU 1 Closure group.

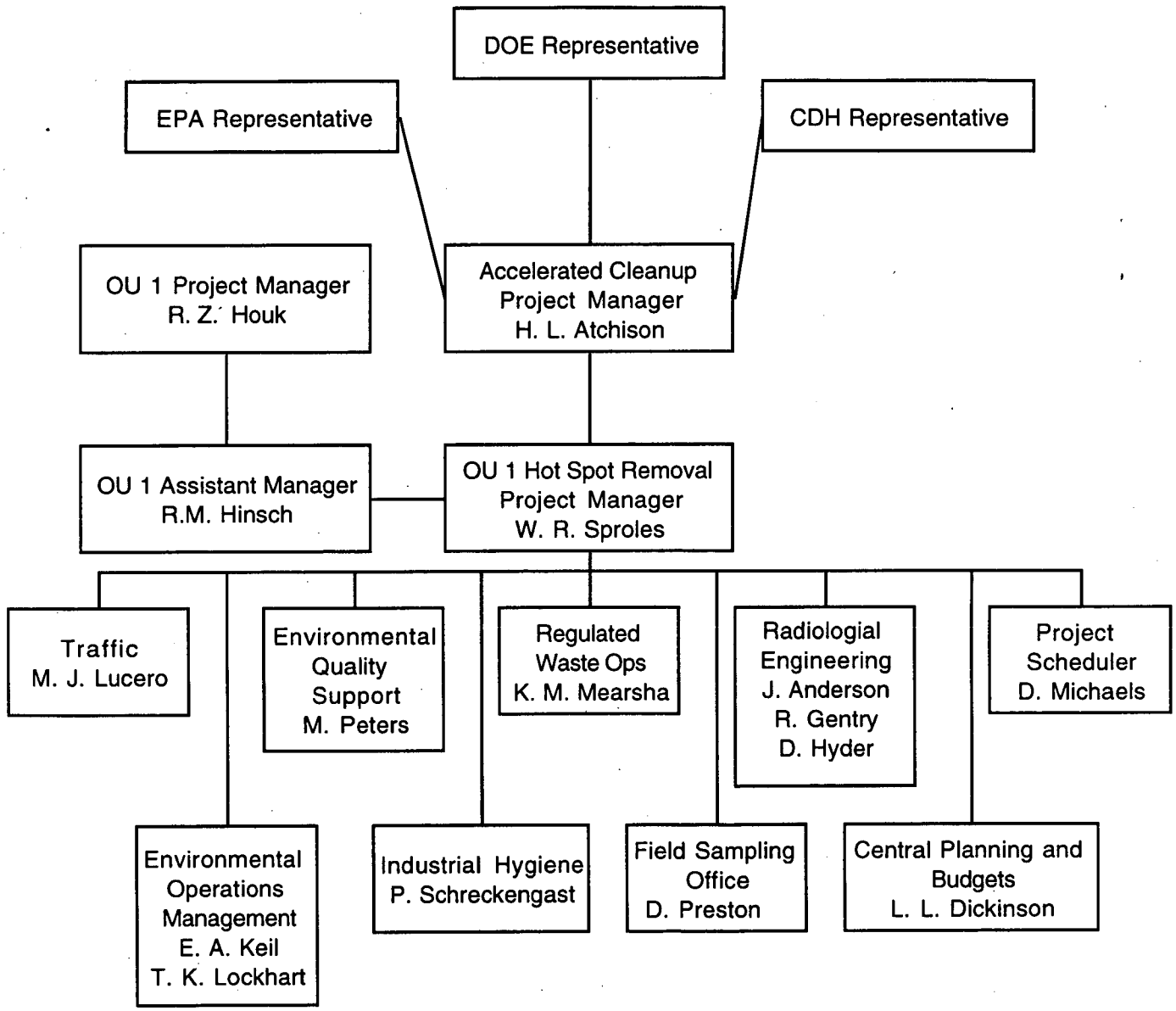
An organization chart for this project is shown in Figure 5-1. The organization has been structured to maintain a high level of quality in all areas of work to be performed. Conformance to established requirements shall be verified by individuals and groups not directly responsible for performing the work. The EG&G ERM organization, specifically the OU 1 Closure group, is responsible for management and coordination of the EG&G resources dedicated to the project.

5.2 Quality Assurance Program

The EG&G ERM Environmental Quality Support (EQS) department is responsible for preparing this QAA and providing internal quality implementation support (including inspections and surveillance of system acceptance and performance) to assure that the quality requirements of this QAA and the QAPjP are being implemented. The QAPjP was written to address QA controls and requirements for implementing environmental restoration activities, as required by the RFP Interagency Agreement (IAG).

The content of the QAPjP was driven by the DOE Order 5400.1, the RFP QA Manual (RFP QAM), and the IAG. Both, the DOE Order 5400.1 and the RFP QAM, require a QA program to be implemented based on the American Society of Mechanical Engineers (ASME) NQA-1, *Quality Assurance Requirements for Nuclear Facilities.* The IAG specifies development of a QAPjP in accordance with the Environmental Protection

Figure 5-1
OU 1 Hot Spot Removal Organizational Chart



Agency (EPA) QAMS-005/80, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* The 18-element format of NQA-1 was selected as the basis for both the QAPjP and subsequent QAAs with the applicable elements of QAMS-005/80 incorporated where appropriate. Figure 2-1 of Section 2.0 of the QAPjP illustrates where the 16 QA elements of QAMS-005/80 are integrated into the QAPjP and also into this QAA. Section 2.0 of the QAPjP also identifies other DOE Orders and QA requirement documents to which the QAPjP and this QAA are responsive.
The controls and requirements addressed in the QAPjP are applicable to hot spot sampling activities, unless specified otherwise in this QAA. Where site-wide actions are applicable to hot spot sampling activities, the applicable section of the QAPjP is referenced in this QAA. This QAA addresses additional and site/project specific QA controls and requirements that are applicable to SAP activities to be conducted at six radiologically contaminated spots within OU-1 that may not have been addressed on a site-wide basis in the QAPjP. Many of the QA requirements specific to the hot spot removal sampling are addressed in the "OU-1 Sampling and Analysis Plan for Hot Spot Removal" and are referenced in this QAA.

5.2.1 Training

The minimum personnel qualification and training requirements that are applicable to EG&G and subcontractor staff for RFP ERM Program activities are addressed in Section 2.0 of the QAPjP.

All EG&G and subcontractor personnel that perform quality-related activities on this project shall have qualification records that document they are qualified to perform their assigned tasks. The EG&G Project Manager shall identify any Rocky Flats Environmental Technology Site (RFETS) area-specific and/or specialized training requirements that are applicable to project personnel.

Job-specific training for field personnel will include:

- OSHA 40-hour Hazardous Waste Operations training
- OSHA Field Experience Checklist
- RCRA Computer-Based training
- RCRA Supervisors Checklist
- EG&G Environmental Management Operating Procedures
- Field Operating Procedures
- Laboratory Analytical Procedures that are applicable to their assigned tasks
- Radiation Worker Level II
- Designated Waste Generator will be RCRA Waste Generator Qualified

In addition to procedures training, EG&G and subcontractor personnel shall receive training on (1) the requirements of the QAPjP and (2) the "OU-1 Sampling and Analysis Plan for Hot Spot Removal" (including this QAA). This training must be recorded, with verifiable documentation of training submitted to the EG&G Project Manager prior to implementing the sampling and analysis activities described in the SAP.

EG&G and subcontractor personnel shall also be qualified to perform the tasks they have been assigned. Personnel qualifications must be documented, with documentation of qualifications verified by the EG&G Project Manager in accordance with ERM Administrative Procedure 3-21000-ADM-02.02, *Personnel Qualifications.*

5.2.2 Quality Assurance Reports

A QA summary report will be prepared at the conclusion of the hot spot removal activities by the EG&G QA Program Manager. This report will include a summary of field operation and sampling oversight inspections, laboratory assessments, surveillances, and a report on data verification/validation results.

5.3 Design Control and Control of Scientific Investigations

5.3.1 Design Control

The OU-1 Sampling and Analysis Plan for Hot Spot Removal describes the general design considerations for implementing work activities, outlining sampling and analysis techniques, describing analytical requirements, and summarizing data management processes. As such, this SAP is considered the environmental investigation control plan for the hot spot removal sampling and analysis at OU-1.

The QAPjP considers activities that generate analytical data, which requires collection and analysis of environmental samples to be scientific investigations. Controls for scientific investigations include:

- Developing data quality objectives;
- Collecting and analyzing samples according to approved procedures;
- Establishing and implementing quality controls; and
- Reducing and reporting data in a controlled manner.

5.3.2 Data Quality Objectives

Data quality objectives (DQOs) quantitatively and qualitatively describe the uncertainty that decision makers are willing to accept in results derived from environmental data.

DQOs were established to make decisions on the number of samples required with a 95% level of confidence. The EPA's Decision Error Feasibility Trials (DEFT), Version 3.01, EPA, 1994 was used to determine the appropriate number of samples to be collected from each sampling location. The isotope of concern's maximum value detected in prior soil sampling was used for the maximum value, on a location-specific basis. Action levels, as required by the DEFT program, were based on Draft Programmatic Risk-Based Preliminary Remediation Goals (PRGs). Because of the very limited amount of previous data, the program default values were used for the standard deviation and grey region limits. A null hypothesis of H_o: mean < action level was chosen for this project. This hypothesis will result in a 95% confidence interval, indicating only a 5% chance of the mean being higher than the action level (false positive).

The number of samples (n values), obtained from the DEFT program, using the following inputs ranged from two to four samples per location. Therefore, the most conservative value of four samples was chosen for each sampling location.

The input, output, and decision parameters used in this program for each of the locations are as follows:

Confirmation Samples:

(1) Has sufficient material been excavated to remove radionuclide contamination to near background levels?

Parameters used in the DEFT were as follows:

Table 5-1
DEFT Software Input/Output Parameters

Sample Location	Isotope of Concern	Minimum Value (pCi/g)	Maximum Value (pCi/g)	Standard Deviation	Action Level (pCi/g)	Grey Region (95% conf.)	Number of Samples
SS100193	U-233/234	0.0	429.0	71.5	45.0	L: 45.0 U: 237.0	3
SS100293	U-233/234	0.0	240.0	40.0	45.0	L: 45.0 U: 142.5	4
SS100393	Pu-239	0.0	21.0	1.3	3.4	L: 3.4 U: 21.0	2
SS100493	Pu-239	0.0	17,400.0	2,900.0	3.4	L: 3.4 U: 8701.7	3
881-16/17	U-238	0.0	1300.0	216.7	46.0	L: 46.0 U: 6730.0	3
881-18/19	U-238	0.0	3000.0	500.0	46.0	L: 46.0 U: 1523.0	3

Precision, accuracy, representativeness, completeness, and comparability (referred to as PARCC parameters) are fundamental parameters used to indicate data quality. The PARCC parameters are summarized in Table 5-2. Detailed definitions and determinations of the PARCC parameters are given in ERM Procedure 2-G32-ER-ADM, 08.02, *Evaluation of ERM Data for Usability in Final Reports,* (EG&G, 1994).

Table 5-2
PARCC PARAMETER SUMMARY

	RADIONUCLIDES	ANALYTICAL
PRECISION	RPD $\leq$ 200 % for Pu and Am RPD $\leq$ 30% all others	RPD $\leq$ 20 % (Liquid) RPD $\leq$ 30 % (Solid)
ACCURACY	Detection Limits in GRRASP	Comparison of LCS with true values
REPRESENTATIVENESS	Based on Use of SOPs and Work Plans	Based on Use of SOPs and Work Plans
COMPARABILITY	Based on Use of SOPs and Work Plans	Based on Use of SOPs and Work Plans
COMPLETENESS	90% Usable 50% Lab Validation	90% Usable 50% Lab Validation

Precision can be defined as how well sample measurement values compare with each other. This comparison can be quantified by the Relative Percent Difference (RPD) value. An RPD of $\leq$ 20% will be considered acceptable for analytical results in liquids and $\leq$ 30% in soil samples. An RPD of $\leq$ 200% will be considered acceptable for plutonium and americium radiochemistry samples and 30% for all other isotopes. The RPD of plutonium and americium radiochemistry samples is higher than analytical samples because these isotopes are extremely sensitive to Mesoscopic and Microscopic Heterogeneities within the sample.

Accuracy can be defined as the agreement of the measured value with the true value of a parameter. For analytical and radiochemistry purposes, accuracy is indicated by the comparison of laboratory control samples to their true values.

Representativeness is based on sampling locations and matrices specified in the SAP. The sampling procedures outlined in the SAP will ensure that samples represent the three-dimensional volume of interest (i.e., shallow soils).

Comparability is established by use of DOE and EPA approved standard operating procedures (SOPs) and analytical/radiochemistry laboratory methods. Field and administrative SOPs are listed Table 5-3. Laboratory methods are listed in Table 5-4. Detection limits for all methods are also given in the GRRASP (EG&G, 1992). When deviations from the standard operating procedures (SOPs) occur, or when new or nonstandard procedures are implemented, a Scientific Notebook System (SNS) will be used as the primary means of documenting quality-related information (analytical method changes are requested from the program chemists and documented in the case narratives).

Completeness is defined as usable data from ≥ 90% of all planned field samples. This will include ≥ 50% of the usable data as validated with respect to analytical and radiochemical laboratory analyses.

Table 5-3
FIELD AND ADMINISTRATIVE STANDARD OPERATING PROCEDURES

EG&G IDENTIFICATION NUMBER:	PROCEDURE TITLE:
• 5-21000-OPS-FO.3	General Equipment Decontamination
• 5-21000-OPS-FO.3	General Equipment Decontamination
• 5-21000-OPS-FO.6	Handling of Personal Protective Equipment
• 5-21000-OPS-FO.7	Handling of Decontaminated Water and Waste Water
• 5-21000-OPS-FO.10	Receiving, Labeling, and Handling Environmental Materials Containers
• 5-21000-OPS-FO.11	Field Communications
• 5-21000-OPS-FO.12	Decontamination Facility Operations
• 5-21000-OPS-FO.13	Containerization, Preserving, Handling, and Shipping of Soil and Water Samples
• 5-21000-OPS-FO.18	Environmental Sample Radioactivity Content Screening
• 2-G06-ER-ADM-05.10	Use of Controlled Scientific Notebooks.
• 2-G32-ER-ADM-08.02	Evaluation of ERM Data for Usability in Final Reports
• 4-E42-ER-OPS-GT.08	Surface Soil Sampling
• 5-21000-OPS-FO.16	Field Radiological Measurements
• 4-B11-ER-OPS-FO.25	Shipping Limited Quantities of Radioactive Materials in Samples

EG&G IDENTIFICATION NUMBER:	PROCEDURE TITLE:
• 5-21000-OPS-FO.14	Field Data Management
• 3-21000-ADM-5.01	Document Control
• 3-21000-ADM-15.01	Control of Nonconforming Items and Activities
• 1-50000-ADM-12.01	Control of Measuring and Test Equipment
• 1-50000-16.16	Corrective Action Program
• 5-21000-OPS-FO.02	Field Document Control
• 3-21000-ADM-17.01	Records Management
• 3-21000-ADM-18.03	Readiness Reviews

Table 5-4
LABORATORY STANDARD OPERATING PROCEDURES

ANALYTICAL SUITE:	CONTROLLING DOCUMENTS:
• VOCs • SVOCs • Metals	Title 40 of the Codes of Federal Regulation Part 264, Appendix IX. All laboratory analyses will also adhere to protocols specified in Parts A and B of the EG&G General Radiochemistry and Routine Analytical Services Protocol (GRRASP).
• Radionuclides	Part B of the GRRASP.

5.3.3 Equipment Decontamination

Sampling equipment that is used at more than one location shall be decontaminated between sampling locations in accordance with Field Operations Procedure OPS-FO.03, General Equipment Decontamination. Other equipment (e.g., backhoe, if used) potentially contaminated during excavation shall be decontaminated as specified in Procedure OPS-FO.04, Heavy Equipment Decontamination.

5.3.4 Quality Control

Field sampling quality control will consist of:

- Collection of field duplicate samples will be at a minimum of 1 per 20 samples;
- Preparation and analysis of an equipment rinsate blank for every 20 soil samples collected (at a minimum or at least one rinsate blank if 20 soil samples are not collected); and
- Trip blanks for VOC analysis

Notwithstanding the QA sample schedule just presented, the number of field duplicates and replicates that will be collected will be limited to one each per day. Analytical laboratory QC for soil sample analyses shall be as specified in the GRRASP.

5.3.5 Quality Assurance Monitoring

To assure the overall quality of the soil sampling and analysis activities associated with the SAP for the OU-1 hot spot removal project, field oversight inspections will be conducted during sampling and analysis activities. Field oversight inspections to be conducted by the ERM Environmental Quality Support department will include:

- Random field inspections;
- Various intervals of audits and surveillances; and
- A minimum of one surveillance per each field activity.

5.3.6 Data Reduction, Validation, and Reporting

Data evaluation and reporting requirements for field and laboratory data are discussed in Appendix A, the Data Management Plan for the OU-1 Sampling and Analysis Plan for Hot Spot Removal.

5.4 Document Control

Documents produced by EG&G that control the work described in this Sampling and Analysis Plan shall be "controlled" to ensure that key project personnel receive accurate and up-to-date information. Such documents shall be controlled in accordance with Section 6.0 of the QAPjP and with ERM Procedure 3-21000-ADM-5.01, *Document Control.*

5.5 Control of Purchased Items and Services

Procurement documents for items and services procured under this project, including services for conducting field sampling and analysis, shall be prepared, handled, and controlled in accordance with the requirements and methods specified in Section 4.0 of the QAPjP and in ERM Procedure ADM-4.01, *Procurement Document Control,* including retention of purchase order receipts, contracts, or any other documentation related to the integrity/traceability of the purchased product or service.

Subcontractors that provide services in support of the SAP activities will be selected and evaluated as outlined in Section 7.0 of the QAPjP. This includes pre-award

evaluation/audit of proposed subcontractors as well as periodic assessment of the acceptability of contractor performance during the project. Any items or materials that are purchased for use during the sampling, analysis, and other SAP activities that have the ability to affect the quality of the data should be inspected upon receipt.

5.6 Identification and Control of Equipment/Items

Soil samples shall be identified, handled, containerized, shipped, and stored in accordance with EM Operating Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. Sampling identification and chain-of-custody (COC) will be maintained through the application of Section 8.0 of the QAPjP and of Procedure 5-21000-OPS-FO.13 which provides instructions for preparing COC forms.

A sample chain-of-custody (COC) will be initiated at the time the samples are collected and maintained through all transfers of custody until the sample is received at the testing laboratory. Samples shall be logged in upon receipt at the analytical laboratory and sample tracking throughout the analytical process shall be maintained in accordance with laboratory procedures.

5.7 Control of Sampling and Analysis Processes

The overall process of collecting and analyzing samples require control. The processes are controlled by adhering to the SAP and the sampling and analytical procedures referenced. The requirements for:

Sample Collection is addressed in Section 3.0 of the SAP;
Sample Analyses is addressed in Section 4.0 of the SAP; and
Data Input will be addressed in Appendix A, Data Management Plan, of the SAP.

5.8 Inspection and Assessment

Quality related activities are subject to inspection and assessments. These assessments will be performed formally in accordance with EG&G procedures (e.g., Procedures 3-21000-ADM-10.01 and/or -ADM-18.02), or informally as requested by line management. The work place and working records shall be accessible during normal working hours for verification or audit by EG&G or their representatives during the performance of this project.

Any nonconformances identified during formal assessments shall be documented with Nonconformance Reports in accordance with Section 15 of the QAPjP and EM Administrative Procedure 3-21000-ADM-15.01, Control of Nonconforming Items and Activities. Independent audits of the project may be conducted by the ERM EQS organization in accordance with QA procedures.

5.9 Control of Measuring and Testing Equipment

Measuring and test equipment (M&TE) used in the screening of samples shall be selected, identified, calibrated, and maintained in accordance with the methods established in RFP Administrative Procedure 1-50000-ADM-12.01, *Control of Measuring and Test Equipment.* The M&TE requirements of Section 12 of the QAPjP are implemented through operating procedures specific to the sampling/analysis event, manufacturers instructions, and specific laboratory procedures. In addition, field equipment utilized during sampling activities will be the Field Instrument for the Detection of Low Energy Radiation (FIDLER), the High Purity Germanium Detector (HPGe), and the HNu instrument. Field equipment documentation will be made on forms identified in Appendix A, Data Management Plan, of this SAP. Laboratory equipment usage shall be conducted in accordance to the GRRASP requirements.

5.10 Handling, Storage, and Shipping

Samples shall be packaged, transported, and stored in accordance with RFP Procedure 5-21000-OPS-FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples.*

5.11 Status of Inspections, Tests, and Operations

The status of the sampling and analysis inspections, startup SAP activities, log of monitoring wells and boreholes, and sustained operations shall be documented according to the requirements of Section 14.0 of the QAPjP.

5.12 Control of Nonconformances

The requirements for the identification, control, evaluation, and disposition of nonconforming items, samples, and data will be implemented as specified in Section 15.0 of the QAPjP. Items, samples, and data that do not conform to specifications and/or requirements shall be identified, segregated (where necessary to prevent inadvertent use), dispositioned, and evaluated in accordance with approved procedures. Nonconformances related to the design, construction, installation, or testing of the testing system, and any waste related nonconformance, shall be controlled in accordance with ERM Procedure 1-50000-ADM-15.01, *Control of Nonconforming Items, Samples, and Data.*

5.13 Corrective Action

The identification, reporting, closeout, and documentation of significant conditions adverse to quality shall be accomplished in accordance with Section 16.0 of the QAPjP and with ERM Procedure 1-50000-16.16, *Corrective Action Program.* Conditions adverse to quality identified by the implementing contractor shall be documented and submitted to EG&G for processing as outlined in the QAPjP.

5.14 Quality Assurance Records

Field QA records will be controlled in accordance with RFP Procedure 5-21000-OPS-FO.02, *Field Document Control.* Project records that are considered ERM QA records include, but are not necessarily limited to:

The final report, (including all appendices);
Design documents;
Procurement documents;
Construction/installation records;
Supplier/subcontractor evaluations;
Inspection records;
Test records;
Logbooks;
Sampling records;
Sample chain-of-custody records;
Analytical data packages;
Interim and annual operating reports;
Action plans;
Operation manuals;
Noncompliance Reports (NCRs);
Corrective Action Reports (CARs);
Audit reports;
Surveillance reports;
Self-assessment reports;
Personnel training and qualification records;
The QAPjP;

Any administrative and operating procedures referenced herein; and
Any other project records that are used to support observations and conclusions in the final report.

All ERM QA records generated shall be submitted to the ERM Project File for processing according to ERM Procedure 3-21000-ADM-17.01, *Records Management.*

5.15 Quality Verification

QA surveillances and audits will be periodically conducted by the EG&G EQS department throughout the duration of project to verify the quality of project data. Readiness reviews will be conducted according to ERM Procedure 3-21000-ADM, 18.03, *Readiness Reviews.*

5.16 Software Control

The requirements for the control of software are not applicable to the SAP activities to be performed at OU-1 hot spot removal locations.